

FACULTY OF ART
PH.D. SCHOOL OF EDUCATION

**INTERDISCIPLINARY LEARNING IN GIFTED
STUDENTS' CLASSES,
AN EDUCATIONAL EXPERIMENT IN A HIGH
SCHOOL**

Submitted by: Winter Shoshana

2008

INTREDUCION

In the recent years, the gifted students have been acknowledged as a unique population to be nurtured and catered to. The nurture of giftedness at different ages is done in different frames, among which is the gifted pupils' class.

Such a class exists in a large high school in the central area of Israel. It caters to gifted students at three age levels: the 10th, 11th and 12th grade.

The students who want to enroll in the gifted class previously studied in regular classes in various schools, so more often than not they come accompanied by anxiety and questions like:

-What else can this class add to my development?

-Will I be able to do things that interest me but are not in the school curriculum?

The school policy is currently under review. The educational team re-examines its policy: (Burg, 1984).

-Shall we emphasize the enrichment programs? In what fields?

-Shall we accelerate the student's learning pace?

-How shall we maintain the balance between the gifted classes and the regular classes' existent in a comprehensive school?

It is important to understand that the differences between students defined as "gifted" are large (Terman 1925, Marland, 1971, Renzulli 1978, Gardner 1983, Haensl, Reynolds & Nash 1986, Milgram 1989, Tannenbaum 1983, Nevo 2004). These students come from different backgrounds and some are new-immigrants. How can we create a class frame capable of fulfilling the expectations of the gifted pupils, in spite of the differences mentioned above?

In Order to give answers to the questions of the students and the school policy, various interdisciplinary curricula were written in the past few years, at my school for the gifted pupils' classes (Van Tassel-Baska 1988) in this interdisciplinary curricula teachers of different subjects were involved. Parts of those curricula were assisted by university scholars and experts in the field.

The aim of the present research is to examine the impact of interdisciplinary curricula described in the present research over the attitudes of gifted students regarding (a)The educational framework and(b)The unique curricula at school, the class, and the teachers, and the attitudes of students regarding interdisciplinary curricula, challenges to

their thinking that the programs provide, and attitudes towards the program itself.

Theoretical Background

The many approaches that exist today towards education of gifted children testify to the fact that there is not one single leading approach. Attempts to cope with the many innovative approaches have created local solutions. Each school operates based on its outlook and understanding, relating to innovative trends and attributes of the new era. The following will be a short survey of the attributes of this new era, and what innovation and renewal in education are.

I will provide a short survey of the definition of giftedness and how it has changed with the addition of research throughout the years, I will describe a number of the new leading and central approaches in teaching gifted children and what needs these approaches satisfy. Furthermore, I will relate to curricula for gifted students, interdisciplinary learning, and of course, teachers who teach the gifted, and the impact of their training over the quality of teaching and students' learning.

What is Giftedness- A short historical survey of the 20th century regarding the issue of giftedness shows that there is no single definition of giftedness. Over the past decade a number of definitions have been constructed, based on research, expanding upon the concept of giftedness, beyond pure intellectual ability.

The first definition of the concept of giftedness was provided by Terman (1925), who determined giftedness as a high level of intelligence. Marland (1971), added **new dimensions** to the definition of giftedness: In addition to intelligence - general intellectual ability and a specific academic tendency, it was also necessary to relate to creative thought and special talents, which could be social leadership, artistic talent and psycho-motor talent. Renzulli's (1978) definition to giftedness is an interaction between three clusters of criteria: 1) high cognitive ability; 2) the ability to persevere in tasks until completion; 3) creativity - expressed in cognitive flexibility. Cognitive flexibility is expressed through identification of problems, creating ideas, new products and originality in applying ideas to solve problems. Renzulli described his model as a Three Ring Concept of intersecting rings. Gardner (1983) identified six separate intelligences: Verbal, logical-mathematical, spatial, musical-physical-kinesthetic, interpersonal, and intra-personal. Milgram (1989) describes giftedness using a cube with four levels, four types and three frameworks. All of the combinations describing giftedness according to this model equal 48, which emphasizes the great variety between students defined as gifted. Tannenbaum's model (1983) belongs to the psycho-social

approach. According to this approach, there are five psycho-social factors. All of the factors together signify the potential for giftedness. Tannenbaum's model can be represented by a star. The **common area** of the five points of the star signifies the potential for giftedness.

There are many more existing theories which shows how varied giftedness is and how little of giftedness is measurable.

Educational Frameworks for Gifted Students-The Israeli educational system is based on the principles of academic and social integration as accepted within egalitarian social perceptions. The concept of giftedness is connected with elitist outlooks. In Israeli it has also taken on an ethnic ring, as IQ testing has shown a higher representation of males from Western ethnic groups. This is one of the reasons that may explain why no efforts were made to formulate policies regarding the gifted until the 1970s (Goldring, Milgram & Chen, 1988). Since the 1980s, special programs for the gifted have begun operating in various frameworks. Goldring, Milgram & Chen classify educational frameworks in Israel into 11 delivery systems that may be divided into two main groups: alternative systems and complementary systems. The alternative systems are systems in which the curriculum for the gifted students takes an entire day of studies and is a full alternative to the regular study hours. Complementary systems are offered to gifted students in addition to their regular schooling.

Educational innovation and innovation in teaching and Needs when teaching the Gifted - The new era is characterized by continual change. The creation of a flexible organizational structure may provide a response to frequent changes. Like other organizations, schools are going through a process of organizational change through the use of information technologies and more. In educating the gifted, emphasis is placed on understanding their special manners of thought, their need for challenges, and cultivating understanding for complex thought methods among gifted students. Educational innovation and renewal are two concepts whose definitions are hazy and unclear. Bamberger(1991) argues that they are difficult to define because they depend on culture, situation and research paradigm. Innovation in education may be found in many contexts, beginning with application of new methods and technologies in education (Chen, 1995a), via processes of reconstruction (Sheran, Shahar & Levin, 1998), or even establishment of innovative schools (Tobin, 1997). a number of models have also been constructed in specific relation to gifted students. Renzulli (1994) discusses schools for nurturing talents and proposes integrating school frameworks with organizational components for the creation of new subject matter and methods of assessment in school. This connection will emphasize aspects such as teaching and

learning for the purposes of lengthwise and widthwise enrichment, use of different techniques to suit curricula to different students, and use of a portfolio for assessing students. In their articles, Shore & Kanevsky (1993) quote research that indicates that gifted students have unique thought traits, and therefore it is not sufficient to group them in special classes or in special enrichment lessons, but there is a need for **unique curricula**. Gifted students think differently, not just faster. Therefore, according to the authors of the article, methods for educating the gifted based on acceleration (learning the regular material but in a shorter period of time) do not satisfy the needs of gifted students because this provides only a quantitative solution, while the need is for a qualitative solution. Curricula that satisfy the needs of gifted students will be **curricula that consider the unique manners of thought** of the students, and therefore use teaching methods that differ from those accepted in regular education. Plucker & McIntier (1996) reinforce the argument that students with greater abilities **need challenges**. According to them, the main factor behind the lack of challenge is a lack of appropriate differentiation from the regular curriculum, that has declined greatly in its level of difficulty in recent years. Kirst (1982) estimates that the level of difficulty of texts had declined at least two levels. Plucker and McIntier add that a lack of challenge from the standpoint of students with higher abilities can be the main reason for them to lose their **positive attitude towards school**. According to Feldhusen & Kroll (1991), "gifted students who are not challenged with appropriate study material and appropriate teaching strategies lose their motivation to learn and become students who do not fulfill their potential". Plucker & McIntier add, when they lack challenge the students use either the strategy of selective attention or selective effort to maintain satisfactory levels of interest and challenge in their studies. Maker (1982) and Van Tassel-Baska (1988) discuss the need to cultivate understanding of complex thought methods among the gifted. It is important to mention the vision of the Israeli Ministry of Education regarding gifted students in this new era which discusses shared excursions of teachers and students to unknown realms.

Teachers for the Gifted and Teacher Training- In the United States, a number of literature surveys have been conducted dedicated to the attributes and skills of good teachers for gifted students (Bishop, 1968; Feldhusen, 1985; Feldhusen & Hansen, 1987, 1988; Hansen & Feldhusen, 1992; Haltgren & Seeley, 1982; Maker, 1975; Seeley, 1979; Sisk, 1975). These surveys indicate that the most important characteristics of teachers for gifted students are flexibility, excitement, self confidence, high intelligence, broad cultural background, suiting assessment methods to the unique needs of the gifted student, in depth

understanding of developmental psychology of gifted children from a cognitive, social and emotional standpoint, and the **ability to cultivate thought and high level problem solving**. Arlin, (1993) , Arnold (1995), Bloom, (1995), Parker, (1996), Landvagt, (2000) have outlined a number of ideal teacher attributes, such as: broad and in-depth knowledge in the subject matter; a passion for their area of expertise and enjoyment of teaching; understanding the developmental psychology of gifted students and familiarity with different definitions of giftedness; willingness to take risks and try new methods; and sharing the learning process with the students. Schulman (1999) said: "I would argue that the essential character of giftedness in teachers is associated not with their initial state, but with their development of capacity to learn. They must learn from their own experience, vicariously from the experiences of others, and from new concepts and ideas. In turn, they must learn to connect what they learn back to their ongoing practice and experience". Earlier studies on teacher training indicate that teachers who have been trained can identify gifted children more readily than untrained teachers (Borland, 1978; Jacobs, 1972). Teachers who have been trained use teaching methods that they did not previously have knowledge of (Gallagher, Ascher & Jenne, 1967). Hanninan (1988) found more significant differences between teachers who had been especially trained and teachers who were not trained for teaching the gifted. Teachers who had been trained: 1) allowed their students more responsibility for their learning; 2) delved more deeply into activities; 3) used a broader theoretical base; 4) emphasized uniqueness; 5) used more resources outside of the classroom; 6) provided specific ideas for student activities; 7) expanded on areas of interest of the students beyond the regular curriculum; and 8) connected between study topics and other issues, more frequently than teachers who did not receive special training. Hansen & Feldhusen (1994) argue that teachers who have been especially trained in the field of educating the gifted, develop a positive atmosphere in the class, emphasize high order thinking skills, and hold more discussions. Only recently have basic principles for gifted students' teachers' training programs been determined in Israel (Zorman, Rachmel & Shaked, 2004). The program is based on four main stages: 1) familiarity with theoretical issues in teaching the gifted; 2) familiarity with experience in the field; 3) formulating and consolidating work methods that are suited to the target population; 4) practical guided experience and reflection.

Curricula and Interdisciplinary Programs -"Real world problems cannot be clearly classified... an artist who does not understand science and technology cannot participate as a conscious citizen in modern society. A scientist who does not consider the aesthetic, moral and financial results

of his work cannot either" (Root-Bernstein, 1987, pg. 21). Kaplan (1986) and Hayes-Jacobs (1989) offers an interdisciplinary model of general subjects. Heaney (1997) presents a model combining science and literature. Vars & Rakow (1993) suggest to reorganizes the curriculum, Make connections and create fusion between number of topics.

Van Tassel-Baska (1995) addresses to five learning models among gifted students. Among the models, I feel it is important to emphasize and detail the **epistemological concept model and the integration model**. These two models emphasize the advantages of interdisciplinary learning.

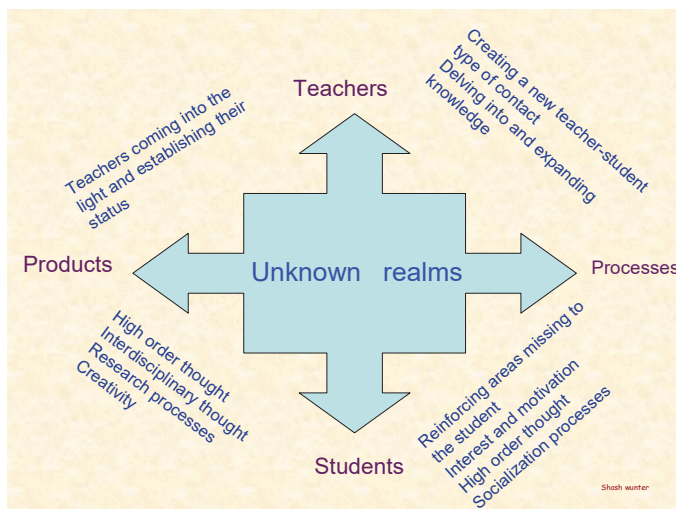
The Interdisciplinary Programs at my School-A steering committee was created in my school to reexamine the aims of the gifted class study track, teaching methods, the available enrichment programs in the gifted classes of the school, and methods of enrichment. Among the aims defined regarding the students, the following are worth noting:

1) Increasing/emphasizing the uniqueness of the curriculum of the gifted students' class compared to the regular class to provide the students with higher abilities and the challenges that they require (Plucker & McIntier, 1996); developing high order thought among the students, also with the assistance of curricula learned based on the instructions of the Ministry of Education (Maker, 1982; Van Tassel-Baska, 1988).

2) Creating curricula in the school that **consider the special ways of thought** of the gifted, and therefore use teaching methods that differ from those accepted in regular education (Shore & Kanevsky, 1993).

The steering committee pointed out that learning in the classes until then had been based mainly on the study material dictated by the Ministry of Education, with the teacher making as great an effort as possible to interest the students in the study topics.

The recommendation was to construct an interdisciplinary program as a possible solution to achieve the goals. According to Senjei (1995) teams within an organization are very important for organizational learning, and developing new and suitable tasks and activities. Therefore all of the subject coordinators and the administrative staff, about 30 individuals, went through a year-long advanced training course in interdisciplinary learning. The staff proposed the epistemological concept model as described by Van Tassel-Baska (1995). This model discusses the exposure of students to **interdisciplinary topics and principles**, which provide an **intellectual framework that does not exist in only one field of content**. The model also provides a context for combining emotional and cognitive aims. The "profits" of the program for the teachers and the students are presented in the following illustration:



A number of interdisciplinary programs were constructed within the school that took into consideration the needs of gifted students and also the existing teaching force.

The Research Assumption

The basic assumptions that I presented to my colleagues were:

- Gifted students and their teachers require stimulation beyond the routine of school, within school walls.
- Interdisciplinary thought is the apex of innovation in the hi-tech world and world of academics, and from my standpoint is a central building block in cultivating **creativity**.
- **Interdisciplinary thinking** which is typical of the gifted population, deviates beyond accepted frames of thought, is aimed towards higher level thought, and attempts to merge different areas of knowledge to achieve new insights.
- The interdisciplinary program encourages **personal choice**, allows the gifted student to clarify and become familiar with his own areas of interest, and increases his **motivation to learn** and his **estimation and positive attitudes towards the school**.

- The vision for teaching the gifted focuses on breakthroughs - going out into unknown realms in processes and products, both for teachers and students. This vision allows us, at my school, to **break out of accepted frameworks, or more properly, fixated frameworks, by not pre-defining the entire process of expected products, and by creating flexible and changeable frameworks.**

The Research Hypotheses

- Interdisciplinary curricula in gifted students' classes change the students' attitudes to a more positive view of their school experience.
- Interdisciplinary programs compatible with gifted students' study pace.
- School's policy, involving interdisciplinary programs, changes according to gifted students' needs.

The Research Variables

The research variables are the six categories of questions that were tested for each of the various programs. The following is an itemization of the categories of questions that will be tested. Each category represents one of the research variables.

Three categories were created for the question: Do interdisciplinary curricula in gifted students' classes change the students' attitudes to a more positive view of their school experience?

a. The impact of interdisciplinary learning over attitudes towards school. (INFSCH)

b. The impact of interdisciplinary learning over attitudes towards the class. (INFCLS)

c. The impact of interdisciplinary learning over attitudes towards teachers. (INFTCH)

The research assumption is that interdisciplinary learning affects the attitudes of the students in all of the components that define the school experience. Therefore only a situation in which all of the research variables indicate positive attitudes and a high degree of agreement, can testify to success.

Other three categories were created for the question: Does the school's policy change according to gifted students' needs? Are interdisciplinary programs compatible with gifted students' study pace?

d. Attitudes regarding interdisciplinary learning. (ATTMUL)

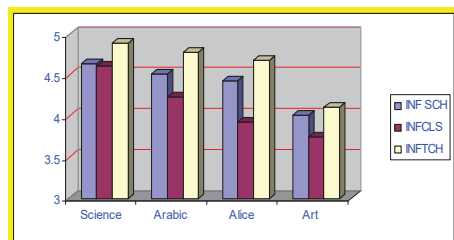
e. Attitudes regarding the need for challenging learning. (ATTCHL)

f. Attitudes regarding the specific program. (ATTSP E)

		a- INF SCH	b- INFCLS	c- INF TC H	d- ATTMUL	e- ATTCH L	f- ATTSP E
<i>Alice in Wonderland</i>	q no	5,6,8,9, Alpha>0.7	9,22,13 Alpha>0.7	17	1,4,7,11,12, 14 Alpha>0.7	3,14,19,24 Alpha>0.7	3,10,19,20 Alpha>0.7
<i>Arabic and Computer Science</i>	q no	8,9,18 Alpha>0.7	13,23 Alpha>0.7	17	1,4,7,12,16 Alpha>0.7	14,19 Alpha<0.7	10,20 Alpha~0.7
<i>Science and Regime</i>	q no	7,16 Alpha<0.7	11,19,21,22 Alpha>0.7	15	3,4,6,10,12,14 Alpha>0.7	5,17,20 Alpha>0.7	2,11,13,18 Alpha~0.7
<i>Physics in Art</i>	q no	8,17 Alpha>0.7	9,12,20,22,23 Alpha>0.7	16	1,4,6,7,11,15 Alpha>0.7	13,18 Alpha~0.7	14,21 Alpha>0.7

The Research Finding

In all four programs in which attitudes towards school were examined, agreement to full agreement were found. The results of the statistical analysis can be presented using a graph that shows the results on the measurement scale between 1 - **don't agree** to 5 - **absolutely agree**

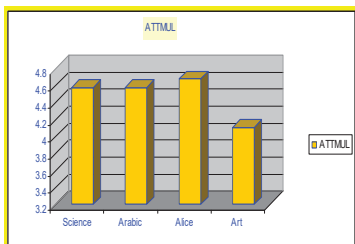


Attitudes of Students towards School according to the Different Interdisciplinary Programs

The positive attitudes towards school are expressed by the fact that no category showed a value lower than or equal to three.

When addressing each of the categories comprising attitudes towards school there are differences between them: The most positive attitudes in each curriculum that was studied were in attitudes towards teachers. ($p<.0001$) Then came attitudes towards school, followed by attitudes towards the class. The interdisciplinary programs "highlighted" the teachers. They allowed teachers to be more clearly seen and to show

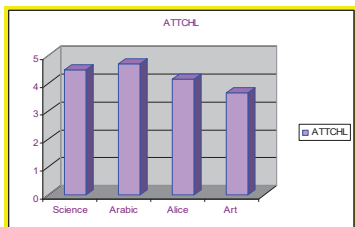
abilities that are not expressed in their regular daily teaching, expanding their dialogue with the students (Plucker & McIntier, 1996).



*Attitudes Regarding
Interdisciplinary
Learning*

This graph indicates that in all four programs, there is positive agreement regarding this learning method. The values are all above four, and therefore express absolute agreement regarding the interdisciplinary learning method.

The next graph indicates the responses of the students regarding the degree of challenge provided by the various programs.



*Attitudes Regarding the Need
for Challenging Learning*

The fact that the students in the gifted students' class in fact identified the challenge and addressed its degree, already testifies to their need for a challenge. A student in a regular class would not necessarily agree with the term "challenge" but would have testified to the degree of difficulty of the assignments.

Conclusions and Recommendation

In response to the main research question, a trend was found towards a **very positive** attitude, clearly showing that the interdisciplinary programs had a very substantial impact over positive attitudes of students regarding their approach to the school.

The impact of the programs over positive attitudes towards the teachers teaching the program is the most prominent. The high values of agreement regarding the learning method indicate that interdisciplinary programs satisfy the students' needs. This need was indicated in the study done by Shore & Kanevsky (1993), who argue that gifted students have

unique ways of thinking, and therefore they may not just be grouped in special classes or enrichment lessons. **There is also a need for unique curricula for them.** They discussed transferring thinking skills from field to field, such as applying mathematical reasoning to a literary problem and vice versa. There is no doubt that the interdisciplinary program applies these types of skills.

It is also important to mention what was stated by Van Tassel-Baska (1995) in her description of the epistemological program: **A gifted child has extraordinary abilities to see and understand mutual connections.** The program provides an **intellectual framework that does not exist in a single area of content**, exposing the student to many ideas that are not possible in the accepted curriculum, and providing the student with the basis for understanding the creative and intellectual process through involving him actively in the creative process. The research findings may be summarized as follows:

1. There is absolute agreement among the students regarding the interdisciplinary study method. This method satisfied the need for a special type of curriculum that satisfies the academic needs typical of the gifted student population.
2. All of the programs provided a cognitive challenge. The challenge for the students was integration of high level thought with the ability to see and understand mutual correlations and transfer of reasoning skills from one field to another.
3. The interdisciplinary programs at the school that were examined were positively assessed by the students.

Research Contribution

What, then, is the innovation of this dissertation, since educational theories for teaching gifted students, considering their special needs, how to write an appropriate curriculum, and the attributes of desired teachers for the gifted are all familiar theories that have been applied in many schools over the years?

Much of the innovation is in going beyond the level of written proposals. In cases where there are applications made, there is not always follow-up or an examination of the results, documentation, and/or the drawing of conclusions.

The interdisciplinary programs described throughout this dissertation which present a different method of teaching a curriculum, include all three of the following components:

An educational perception anchored in existing theories regarding innovation.

This outlook is processed and translated into an **operative program** that suits teaching methods to the gifted student population, providing this population with an intellectual framework that exists not only in one area of content, exposing the student to many ideas that are not possible in regular curricula. It provides the student with a basis for understanding the creative and intellectual process, through his active involvement in the creative process.

This takes place in special classes in a regular high school.

And finally, there is an **examination** of the applicability of the idea and its correctness.

Recommendations

It would be worthwhile to conduct a comparative study between two schools having similar background data, in which one does not use an interdisciplinary program, to reinforce the findings. The following questions are of great interest:

1. What happens to teachers over time? Does work with gifted students impact their work methods in other classes?
2. Does learning using "interdisciplinary programs" help the gifted student develop his ability to connect between subjects, beyond his studies in high school?

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